

SMALL BUSINESS GROWTH AND INTERNAL TRANSPARENCY: THE ROLE OF INFORMATION SYSTEMS¹

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team developed an IS-enabled solution to address their growth needs. During the progression of the project, a new outcome of organizational effectiveness, internal transparency, was identified and developed. Adopting a punctuated equilibrium perspective, a theoretical process model is proposed that sheds light on a relationship between internal transparency, small business growth, and IS. The paper concludes with observations that internal transparency may well be a concept that offers significant potential for MIS research as well as a discussion about the applicability and credibility of participatory action research for this project.

Abstract

While many large businesses start out as a small enterprise, remarkably little is known about how an organization actually changes internally during the periods of growth. Small business growth is known to strain internal communication processes, for example, which likely limits growth opportunities. Information systems are often called upon to remedy such deficiencies. Through a participatory action research project, we investigated the ways in which a small business management

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Introduction

Small businesses are an important and integral part of every nation's economy and have been long recognized as different from large businesses (Hambrick and Crozier 1985). In order to grow, small businesses must evolve their organization, incorporating changes to management structure, operational planning, control, and communication processes (Hanks 1990; Steinmetz 1969), without

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impairing the firm's competitive advantage. Failure to make these changes may result in harm to the business through stagnation, negative growth, loss of customers, and failure to introduce new products, potentially closing the business (Churchill and Lewis 1983; Hambrick and Crozier 1985). Information systems are often relied on to assist growth, although small businesses often find technology difficult to implement due to resource constraints (Raymond 1985).

There is significant research about the role of IS in small businesses (e.g., Cragg and King 1993; Harrison et al. 1997; Igbaria et al. 1997). While this research informs ours, this paper enters a new area: what happens to the IS of a small business as a growth period begins. Rather than seeking to understand the effect of the traits of an organization on important phenomena such as selection, adoption, and implementation, we focus on how those traits affect an organization's IS changes during the business' transition period. These transitions may be due to external factors (e.g., a general economic downturn requiring a decrease in size). Alternatively, a company's management may decide that they wish to try to grow proactively, through targeting a larger or more lucrative market. Our interest was the recursive relationship between this decision and the IS in the business: specifically, would there be a need to change the existing systems, what triggers this need to change, and what new or revised demands would these decisions have on the existing IS infrastructure?

A useful analytical framework is provided by punctuated equilibrium theory (PET) (e.g., Gersick 1991; Romanelli and Tushman 1994; Tushman and Romanelli 1985), a theory that has been adapted from evolutionary biology into management theory. Researchers who use PET typically focus on three concepts: evolutionary periods, revolutionary periods, and deep structures. From a PET perspective, it can be argued that organizational development is characterized by stable periods of evolutionary change that are occasionally *punctuated* by periods of rapid change (Gersick 1991; Van de Ven and Poole 1995). For example, an organization's IS can be seen as a

form of deep structure. Managerial behaviors can alternately perpetuate or weaken existing structures (Orlikowski 2000; Orlikowski and Robey 1991). PET suggests that behavioral changes in response to punctuations cause structural changes. For example, the decision to change IS strategy and implementation in response to corporate strategy can be seen as a change in the deep structure as a response to short periods of sharp, extensive change (punctuation) (Sabherwal et al. 2001). From this perspective, the decision to grow can also be thought of as a punctuation and the information system as a deep structure that may change as the management team responds to the punctuation.

To address our research question, we joined with the five-member management team of a small Canadian manufacturing company to develop a research partnership using participatory action research (PAR). Before the project, the company owner had been searching for assistance to investigate how IS could be used to assist his firm through a planned growth period. This can be seen as his initial response to the punctuation. As expected, there were other behavioral changes in response to the punctuation from other management team members. The organization provided an excellent opportunity to investigate our area of theoretical interest: the effect on the deep structure of the information system of a small business in response to this type of punctuation. Through the project, a request for quotation (RFQ, a document upon which potential vendors can bid for a contract) for a new system was developed, satisfying the company's practical goals. In the end, a richer understanding of how growth pressures a company's information resources was reached, satisfying our research goals.

The paper proceeds as follows. Literature from the small business growth and information communication areas is presented. The description of a research project designed to address the questions posed above is followed by a narrative account of the project itself. The critical events that occurred during the project are then discussed, and an explanation is presented that resolves the issues raised during the project into a

cohesive picture of what was happening in the company during the growth process. The paper concludes with the proposal of a process model and a discussion of the research and managerial implications of this project.

Theoretical Perspectives

The small business and information technology literature has seen considerable progress addressing specific adoption decisions and implementation practices. Our contribution lies in understanding the process by which a small business information system is changed in response to the organization entering a growth phase. To do this, we will integrate three research perspectives. First, an overview of the small business literature is provided. Second, we develop and define a construct, internal transparency, which reflects the extent to which the management team understands the activities and outcomes of the organization, which is partially determined by the team's communication behavior. Finally, small business growth models, and their framing of management team behaviors, specifically information sharing and communication behavior, are reviewed.

Small Businesses

Defining a small business is a controversial topic. Like many authors, we have adopted a commonly used definition from the U.S. Small Business Administration: a small business is independently owned and operated and not dominant in its field of operation (Small Business Administration 2003). For our discussion of small business, we are excluding microbusinesses of less than five employees (Hodgetts and Kuratko 2001) and focusing our attention on small manufacturing enterprises interested in growth. For these businesses, an important source of competitive advantage is the ability to remain flexible and responsive to the business environment (Barringer et al. 1998). While this adaptability is beneficial during transition periods, small businesses are

more challenged than large companies by resource constraints such as access to financial capital, and technical or managerial skills, which often significantly reduce the number and type of options available to management (Hodgetts and Kuratko 2001; Iacovou et al. 1995).

Small businesses are typically characterized by a flat organizational hierarchy and close proximity to coworkers, which is believed to contribute to effective communication practices, often comprised of informal channels (Vinten 1999), and typically carried out face-to-face as the need arises rather than through regularly scheduled meetings, formalized status reports, or structured briefings. These channels are considered a significant benefit of the small business environment, providing superior operational flexibility (Wickert and Herschel 2001) and responsiveness (Montazemi 1988). These communication practices allow the small business manager to understand very well what is going on within the firm.

This awareness is threatened, however, during small business growth as changes in organizational structures, such as levels of organizational complexity, formalization, and centralization (Churchill and Lewis 1983; Scott and Bruce 1987), break down existing ways of working. Further, as growth occurs, managerial capacity constraints (Jensen and Meckling 1976; Oi 1983) imply that existing behaviors are further reduced in frequency as new behaviors are adopted to manage the growing firm. As small businesses undergo these changes, a differentiating factor between successful and unsuccessful firms is that successful firms act in "anticipation of bigness" (Hambrick and Crozier 1985). These firms proactively lay the foundation for the bigger enterprise before growth occurs, thereby preempting avoidable barriers to growth such as reactive management.

Growth stage theories provide a measure of predictability regarding what to expect in anticipation of getting bigger (Churchill and Lewis 1983; Scott and Bruce 1987). However, while there is significant literature on the stages of growth theory, it is focused at the firm level of analysis and describes characteristics (particularly

in relation to complexity, formalization, and centralization) that are likely to be present at a certain growth stage. There is little literature that describes the evolution of these characteristics or managerial actions at the start of a growth phase, and particularly so at the level of the individual or management team. This is surprising as it is well-accepted that as a result of growth, managers become removed from business operations, which creates a broad set of difficulties in areas of communication, coordination, and control (Churchill and Lewis 1983; Greiner 1972; Olson and Terpstra 1992). The dynamic process by which these problems arise seems to be under-studied. As growth occurs, the management team become less involved with daily matters and begins to receive information indirectly from many sources. As organizational complexity and formalization increases, informal communication practices may no longer provide the necessary level of managerial information (Bavelas 1951; Leavitt 1962). Therefore, we would anticipate that an outcome of small business growth would be that management's communication behaviors will change and that business outcomes will be affected by the degree to which these changes constrain or facilitate the availability of requisite information for decision-making purposes.

While stage models have been criticized as atheoretical and simplistic (e.g., Stubbart and Smalley 1999), they are useful in understanding the organizational aspects of what should change in a business. However, they are ineffective in answering our research questions, which concentrate on why and how things change. As this study is focused on the start of a growth period, after initiation but before success can be determined, growth stage models would identify the position at which we sit, the expected characteristics, perhaps the characteristics of the next plateau, but unfortunately little else.

So, while our investigation is informed by growth stage theories, punctuated equilibrium theory (e.g., Gersick 1991) is a more appropriate frame for the type of small business growth under investigation. Newman and Robey (1992) proposed that PET may be a useful perspective for

modeling the development of IS within organizations. As well, Sabherwal et al. (2001) used PET to investigate the relationship between strategic business and IS alignment. Drawing upon case studies of three large organizations, they found that the evolution of an organization's IS, including sustained periods of misalignment, could be analyzed using a PET lens. As mentioned earlier, an organization's IS can be seen as a deep structure, decisions to change corporate strategy as punctuations, and changes over time as responses to regain equilibrium within the organization. This study follows Sabherwal et al. in viewing a change in business strategy as a punctuation.

Small Business and IS

While small businesses have been traditionally seen as reluctant to invest in IS (Lees and Lees 1987), evidence over the past decade shows an increase in the awareness and management of IS in small businesses by owners and managers (e.g., Ballantine et al. 1998; Bergeron et al. 2001; Hussin et al. 2002). IS research has considered a variety of these situations. First, technology adoption problems have been investigated wherein factors such as the role of the president/CEO (Cragg and King 1993; Thong 1999; Winston and Dologite 2002), perceived usefulness or relative advantage (Cragg and King 1993; Thong 1999), and ease of use (Iacovou et al. 1995; Thong 1999) were identified. Similarly, Harrison et al. (1997) used the theory of planned behavior to explain the actions of small business executives with respect to IS decisions. Implementation has also been investigated. The small business owner's attitude toward IS is understood to be an important factor in determining implementation success (Winston and Dologite 2002). Training and on-going user support are other post-implementation issues of importance (Igbaria et al. 1998; Zinatelli et al. 1996).

An important common theme in this research often conflates the president's role as business executive and decision maker with his role as an individual user, which is reasonable given the

president's central role in making organizational adoption decisions. In general, understanding the individual roles of managers is considered pivotal to understanding the way in which IS is adopted and implemented in small businesses.

Internal Transparency

In general, IS researchers have found results consistent with those from other management fields that show the owner and managers of a small business as being intimately involved in the daily operations of the small business, gathering and acting on information first-hand. A measurable result of the management team's communication process should then be the degree to which management personally understands what is going on throughout the enterprise. While many authors discuss such outcomes without specifically defining an outcome measure (arguing more is better), there is a consistent theme in several literatures that supports a construct called internal transparency.

Two different types of transparency can be defined: internal and external. External transparency corresponds to the outcome of communication behaviors directed outside the organization. For example, within the accounting and finance literature, transparency is considered as the observability of transactions, for both investment (e.g., Phillips et al. 2002) and regulatory (e.g., Vishwanath and Kaufmann 2002) purposes. Similarly, from the supply chain management perspective, information exchange between supply chain partners (e.g., Lamming et al. 2001) is described as a type of transparency. Within the marketing literature, information flow from the customer is seen to be valuable (e.g., Narver and Slater 1990). Further, the positive role of IS in increasing transparency has also been highlighted (Day and Wensley 1988; Min et al. 2002).

Internal transparency corresponds to these behaviors but is applied within the organization (e.g., Alavi and Leidner 1999). In the organizational behavior literature, it is also considered an outcome of communication behaviors. One

example is when supervisors hold frequent meetings to share information with subordinates to disseminate requisite information to meet individual, team, and organizational goals (Beech and Crane 1999). Communication behaviors can also decrease transparency. Failures to share information through practices such as screening out often lower the ability of decision makers to make decisions (Pfeffer and Salancik 1978). Operations management researchers have found similar results with respect to work teams (e.g., Ang et al. 2000; Forza 1995).

The IS literature expands on the role of IS in creating transparency, while frequently not conceptualizing the outcome. IS are used to enable information sharing between individuals (Alavi and Leidner 1999) and organizations (Braunstein 1999). Technology is also credited with helping to keep information up-to-date, fresh, and dynamic (Schwartz and Te'eni 2000). In this perspective, IS are seen as an enabler of transparency.

A conceptual definition of transparency can be constructed by comparing the similarities and differences within this literature. First, transparency is regarded as an outcome measure of communication behaviors (Ang et al. 2000; Beech and Crane 1999). Second, transparency is also seen as an outcome of an exchange process between two or more entities (Alavi and Leidner 2001; Lamming et al. 2001). From this, we define internal transparency to be an outcome of communication behaviors within an organization that reflects the degree to which employees have access to the information requisite for their responsibilities. An important enabler of the communication behaviors is an organization's technology-based IS, as several literatures recognize the important enabling role of IS in increasing transparency (Alavi and Leidner 2001; Min et al. 2002).

Commonalities throughout the literature allow us to consider how to operationalize internal transparency. First, transparency is normally considered as an ordinal measure exhibiting signs of *less* and *more* (Forza 1995; Narver and Slater 1990). Second, it is frequently discussed as a

mediator: communication behaviors create a level of transparency which itself affects outcomes such as performance (Braunstein 1999) or coordination (Lamming et al. 2001).

Thus we see internal transparency as an ordinal measure expected to mediate relationships between communication behaviors and outcomes such as planning ability or decision making. It is not a measure of the information processing capabilities of an individual or an organization, although an increased ability to process information can certainly be expected to impact transparency. Internal transparency represents at least one way to examine how changes to communication behaviors in response to organizational growth pressures affect, and are affected by, changes to the existing IS structures of a small business.

Summary

A positive characteristic of small businesses is the tight communication and coordination within the organization (Montazemi 1988; Wickert and Herschel 2001). These businesses operate under significant constraints with respect to capital, managerial time, and expertise. At times of growth, these conditions stress the organization and may lead to changes in information sharing and communication behaviors, which will likely have an impact on internal transparency. Increased use of IS might be expected to enable an increase in the internal transparency available to the firm as it grows. However, we are interested in the process by which the existing IS becomes seen as no longer supporting internal transparency, and how this further affects ongoing communication practices. Understanding this effect is crucial because without requisite communication, the organization may find itself unable to sustain its activities, much less grow. We have developed a definition of internal transparency to help us understand and discuss how changes in information sharing and communication behaviors impact managerial decision making, which allows us to further examine the relationships between small business growth and organizational IS. In

the next section, we introduce the research site and project that we used to understand these processes.

Research Method

Our research goal is to address why and how the IS of a small business had to change in response to a specific punctuation, particularly through changes in communication behavior. As we wanted to work with a real organization on a real problem, we had to find an interested organization. A government-funding agency was the catalyst in this search process. The agency's primary goal was to sponsor university-industry collaboration in the manufacturing sector. Specifically, they encouraged placement of researchers directly in the organization. Earlier in 2001, the funding officer had spoken to one of the researchers about topics of interest. She had also met with the president and owner (Nick) of a small Canadian electronics manufacturer, ELCO (all names are pseudonyms). Nick, aware of the program's goals, was seeking assistance in evaluating and specifying a new information system for ELCO. The second author's name was mentioned during the conversation as a potential resource and introductions were made. The reader should be aware that the funding officer would speak to hundreds of companies and dozens of researchers in the course of a year in order to find mutually compatible pairs and generate projects.

The role of the agency officer in setting expectations on both sides cannot be understated. She made it clear to each participant that both party's interests would jointly need to be satisfied in order to meet the agency's goals. Through two meetings (July and August 2001) and a series of e-mails, Nick and the authors worked their way through Rapoport's (1970) initiative dilemma: how to specify a research project that satisfies both a research question and a practical business need. Nick's requirements were an impartial assessment of ELCO's IS needs, a plan to fulfill those needs, and an RFQ specifying system requirements for vendors.

As researchers, we were interested in ELCO's information system needs, as well as understanding why these needs existed. For example, one issue that Nick initially brought up was that his management team was having difficulty getting started performing a systems analysis independently. We responded that, as it addressed our research questions, we were also interested in why they were experiencing difficulties, and where the root cause of any problems might lie.

In retrospect, the research proposal was developed quickly for two primary reasons. First, both parties had clear objectives before meeting. Mutual goals that normally have to be balanced through a negotiation process (Kock 1997) existed but were flexible to the extent that both sides were able to satisfy their needs. For example, the authors were not as concerned with the specific needs of the company as they were with the generic process being experienced. Similarly, while Nick accepted that efforts would be directed toward understanding the "hows and whys" of the process, he also insisted from the start that the company's goals be met. Second, the funding officer made clear to each side that the participants' respective needs had to be met in order to satisfy the agency's goals. Third, Nick did not want to engage a consultant as he thought that they would be biased toward a "big IS" solution, whereas he thought that academic researchers would be less biased to such an outcome. It could be said that Nick and the authors formed the core team in the research project; the full research team would include the remainder of ELCO's senior management.

Research Design

To address this research problem, the authors adopted an interpretivist perspective of scientific realism (Psillos 1999). A scientific realist view typically holds that knowledge is socially constructed. Researchers attempt to understand a process in terms of how the individuals involved comprehend and attach significance to how the

process came about, how it currently exists, and how it is likely to exist in the future (Orlikowski and Baroudi 1991). Consistent with the intent of our research questions, and with the nature of the interpretivist view, the research process focused on making sense of the changing organizational situation as it emerged (Singer 1999).

The congruence of our goals, the funding agency's goals, and Nick's goals led the core team to choose action research (e.g., Elden and Chisholm 1993; Rapoport 1970; Susman and Evered 1978) as the research method for the following reasons. First, ELCO believed that it was necessary that the authors apply their technical and process expertise to the practice problem. Second, the authors believed that action must be taken in the company in order to answer the research questions. Particularly, it was thought that only through actual analysis of IS needs would light be shed on the reasons why ELCO's IS needs seemed to change. Third, it would be possible to satisfy both interests without compromising the integrity of either the practical or theoretical results.

To refine our plan, we drew on the general action research process proposed by Susman and Evered (1978). This research process has been used successfully for IS research in the past (e.g., Baskerville 1999; Davison and Vogel 2000; Olesen and Myers 1999) and was a good fit with our needs. Specifically, we adopted participatory action research (Baskerville 1999; Eden and Huxham 1996) as it allows researchers to become deeply involved with the organization (Olesen and Myers 1999) and engages the practitioners directly with research questions (Eden and Huxham 1996). Greater involvement is beneficial in circumstances where researchers gain investigative value from an insider's view of a problem context, and where the change process itself is the subject of inquiry (Davison 1999).

ELCO did not have a standard development plan template that we would follow. As part of the research process, the authors suggested a three-stage process to structure the project. The plan

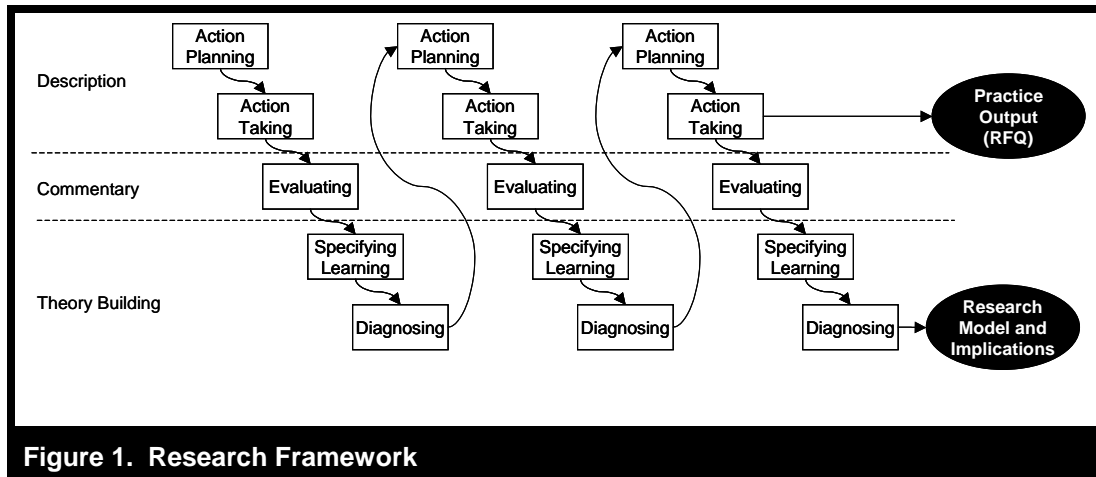
was to perform an intensive requirements analysis in the first stage, followed by a planning process in the second stage for the purpose of developing an outline to address the issues raised in the first phase, and ending with a development stage where a request for quotation (RFQ) and implementation plan would be generated. Readers will recognize this process as a segment of a standard system development life cycle model (e.g., Pressman 2001), commonly taught in many computer science, engineering, and IS programs as well as employed by many organizations. Both authors had academic and practical experience with these methods and felt comfortable in leading this process, which met with Nick's expectations.

The second and third stages built upon data generated from each previous stage, reflecting the iterative nature of action research (Lau 1999). Overall, we planned for three iterations of the general action research model of diagnosing, planning, taking action, evaluating the actions, and drawing key lessons and research findings from each stage. These three iterations coincided with the deliverables in the project. As we would be finalizing the next intervention after the completion of each deliverable, it seemed sensible to have the action research cycles coincide with these as well.

Narrative-based theory development, as is common to the action research literature (e.g., Chiasson and Dexter 2001; Olesen and Myers 1999), typically involves moving from empirical observation to generalizable relationships (Van de Ven and Poole 1995). This is a challenging undertaking that first requires explicating of characters, events, and the causal relationships in a process as the basis of theory development (Langley 1999). Using the framework provided in Figure 1 provided us with the structure and guidance to manage Rapoport's (1970) role dilemma, in which the researchers need to concern themselves with the practice and theory problems. In the action planning and action taking stages, we were comfortable, as was expected, applying our expertise and knowledge to ELCO's operations and working as part of the management

team. As outlined in our reporting section, we actively collaborated with ELCO's managers in planning the next phase of action and participating in its execution. Following the action planning and taking, we took the opportunity to evaluate our results. We did this by directly asking the managers for their opinions and through group discussions. After taking stock, we moved to the final two stages, specifying learning and diagnosing, where we concentrated on our research questions. In specifying learning, we focused on what we learned about ELCO. In diagnosing, we directed our perspective toward abstraction. We then presented our developing interpretations to the entire team to gain their feedback. After suitable refinements, the diagnosing stage guided our actions in the next action planning stage. This framework enabled us to move effectively from observations to identifying the underlying relationships as required for theory development.

The research plan was formalized in a written proposal as a six-month project running from September 2001 until February 2002 and was jointly submitted to the government funding program coordinator by the core team. Initially, ELCO's owner indicated there should be two parts to the research project: first, to determine if changes to the IS were truly necessary, and second, if changes were required, what they should be. The research plan proposal called for the authors to deliver the final project report in the form of a system specification, or RFQ, suitable for potential vendors. In return, ELCO agreed to provide direct management time equal to the amount of time put in by the authors, a figure amounting to one day per month per manager for the duration of the project (in the end significantly more time was committed by all). As was normal for these projects, a research budget of \$16,000 (Canadian) was established to cover primarily travel—ELCO is approximately 100 km from the university—and other research expenses. The agency expected a copy of the final report and regular feedback regarding the wider applicability of the analysis results to other small manufacturers. This paper would also be considered part of the feedback.



Data Collection and Reflection

Project data were continually collected, analyzed, reported, and revised throughout the project. Data took many forms, ranging from the e-mails between project members over the six-month period, operational, financial, and strategic planning company records, website data, working notes from project meetings and presentations, as well as transcripts from three rounds of personal interviews between the authors and management team members, periodically spaced throughout the project. The dataset represented both the formal thoughts and intentions of the management team, captured by documents such as strategic plans and formal presentations of findings, as well as the informal responses and opinions, captured through interview and e-mail transcripts. More than 500 pages of documents were collected over the course of the project.

In order to include managers in the research team and to collect data from multiple rich sources (as suggested by Baskerville and Pries-Heje 1999) while dealing with an operating manufacturing plant, almost all project team meetings occurred at ELCO. Further, most interviewing as well as observations of the work environment took place in the personal offices and meeting rooms at ELCO. Specific sessions that were thought to demand few interruptions were scheduled off-site as necessary.

For example, a strategy planning session for all participants was held at off-site facilities.

The Research Site

Founded in the 1950s, ELCO manufactures high-accuracy electronic equipment with an international reputation for product quality. The company built their product line through the introduction of innovative technologies, incorporating leading edge research directly from government laboratories (not related to the funding agency). The company gained maturity and market presence but never grew very large. In the mid 1990s, the company went through a severe cash crisis. ELCO survived through a loyal customer base and careful management and, in 1999, Nick purchased ELCO and became president and CEO. By 2001, 32 employees staffed engineering, manufacturing, and marketing functions and annual revenues were approximately \$5 million (Canadian).

For the duration of the research project, the management team consisted of five individuals: Nick; Jerry, the general manager; Diane, the controller; Bruce, the manufacturing manager; and Tim, the engineering manager. Jerry, Diane, and Bruce had each been with ELCO for over 15 years, while Tim came to ELCO shortly before

Nick's purchase. While this team may seem large for a small business (5 out of 32 employees), it represented the entire management team: all other employees reported directly to one of these managers. It was also the same management structure that had managed 70 employees before the mid-1990s cash crunch. This firm is different than many studied in small business and entrepreneurial research in that it was nearly 50 years old. The management team understood that Nick bought the company as his last entrepreneurial endeavor and that his primary goal was to grow the company over a five-year period, then sell his investment and retire.

The full research team consisted of the two authors and the five managers. Having a research team comprised of both ourselves and the existing management team was consistent with both our research ethics and with the goals of participatory action research (Baskerville 1999; Singer 1999). In accordance with Eden and Huxham (1996), PAR participants should be regarded as equal and voluntary members of the research team involved in the constructive process of probing, solving a real organizational problem and considering the research question.

While distinct roles existed within the team, these changed over the course of the project. For example, the authors' role during the opening weeks of the project involved gathering data related to ELCO's operations, barriers to effective action, and synthesizing a shared view of the situation. ELCO's managers were initially to provide their interpretations and viewpoints of what the important problems and significant barriers were, as well as evaluating the results and providing feedback to the investigators during the analytical portion of the project. In many ways, the authors' role was initially one of analyst, while management's role was that of informant. These roles reversed over the course of the project as the task moved from identifying the problems to finding and implementing possible solutions. The authors gradually became advisers to the managers as they worked toward solving ELCO's problems.

As mentioned earlier, Nick wanted ELCO to grow so as to maximize his investment. In our initial meetings, Nick identified two key managerial problems: how to reduce the amount of time and effort spent "wading through paper," and how the management team could be assisted in planning and implementing their individual strategies to support ELCO's growth. Nick thought the two questions were interrelated: reducing time spent assembling information would enable more time to be spent on growth planning. He also thought that improved IS could address these problems. For example, he mentioned that perhaps an enterprise resource planning (ERP) product would help, but he was uncertain ELCO could afford it.

The managers felt that they were not developing a good growth plan for the future and were losing contact with current operations. The management team worried that ELCO's IS would be unable to support the upcoming growth. For reasons primarily related to the mid-1990s cash crisis, the IS had become outdated and incompatible across functions. For example, there was no local area network; a single computer was connected to the Internet via dial-up connection.

The manufacturing and inventory functions were supported using an early 1980s minicomputer, which was, in the managers' view, held together through a combination of "binder twine" and the grace of Diane, who was responsible for its programming and maintenance but had no formal training. On the other hand, employees performing sales and marketing functions used relatively recent PCs and office productivity software. The engineering department used old and unsupported software on new PCs. Certain business processes, such as accounting and financial management, used more than one system with data shared through reentry. Many routine management tasks required significant manual assembly of information across multiple platforms and numerous informal requests for information. During the authors' early visits to ELCO, deep paper stacks were on each manager's desk. When asked what information was contained in a 5 to 10 page printout, the manager would mention either one or two important

numbers or shrug uncomplainingly. The similarity was striking between this firm in 2001 and those described six years previously by Cragg and Zinatelli (1995). It was clear that ELCO had not adopted many possible technology innovations in the past decade, in spite of the fact that their product required leading edge electronics technology.

In preliminary discussions, the management team expressed goals very much in line with those found by Pollard and Hayne (1998) including using IS for competitive advantage, developing IS project management skills, building responsive IS, aligning IS and business planning, coping with the technological change, planning and managing communications networks, facilitating and managing business process redesign, educating users, and recruiting and developing IS human resources. One exception was that ELCO's management expressed opposition to creating any software development capability. Cragg and King (1993) found that enthusiasm for the technology was a precursor to increased IS use in small businesses and that resource constraints and limited education were among the factors that inhibited applications growth. Both were demonstrated at ELCO. Therefore, the authors drew the observation that this was a representative small manufacturing firm with typical goals, limitations, and current environment.

What emerged for the authors was a perspective that Nick's decision to grow the company was a punctuation for ELCO. The management team's belief that the IS needed to change could be seen as a weakening of one of ELCO's deep structures. What was not clear was what behavioral changes led to this weakening, as would be suggested by a PET perspective (Gersick 1991).

Reporting the Action Research Cycles

For each of the three action research stages, we present the events and the analysis and discuss

the results. While stages occurred sequentially, the boundaries as described in Figure 1 between each stage were not as unidirectional as the diagram would make them appear. While in general the stages occurred in that order, the problem resolution and theory development actions often occurred concurrently, as is expected in PAR (Baskerville 1999). As the authors completed the documentation and analysis of each stage, it was turned back to the research team for discussion and revision before moving on.

Stage 1: Baseline Analysis

As the practical goal of the project was to recommend potential changes to the organization's IS, the first actions were to follow general system development practices and begin with determining current organizational practices and directions. We did this recognizing that the managers felt that the IS had to change; we needed to understand why this belief had developed.

Action Planning

Project scope and data collection methods were reviewed at the first research team meeting. We decided to capture current practice and future requirements by involving ELCO's employees directly in identifying their job tasks and information requirements. The authors also interviewed each manager individually for their opinions on future requirements. Two general questions—what are your short- and long-term functional goals and what barriers or challenges do you see that might make it difficult to achieve those goals—formed the basis for these open-ended interviews. By examining the congruency between the managers' future plans and intentions and comparing this to the managers' experiences, a clear picture of where difficulties were occurring was expected to emerge.

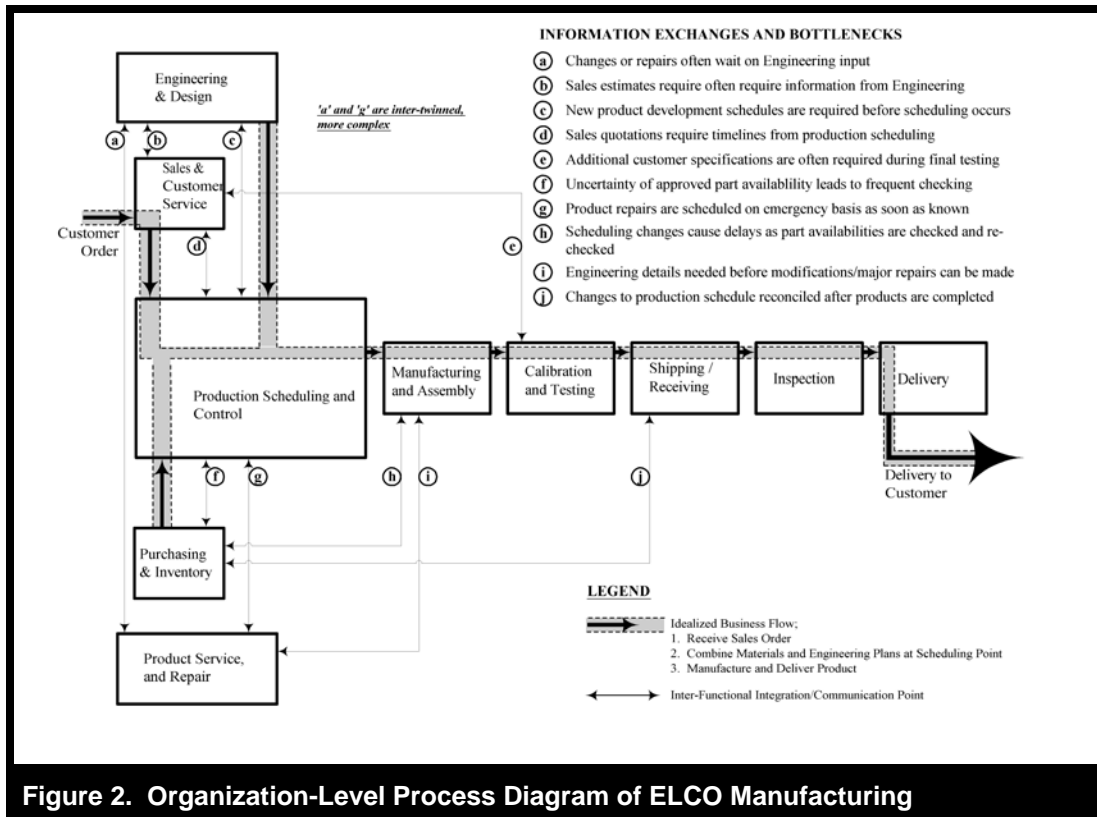


Figure 2. Organization-Level Process Diagram of ELCO Manufacturing

Action Taking

Meetings with employees were held two weeks after the initial meeting. Over the next three weeks, the authors used the data to create a process diagram of ELCO's operations that indicated boundaries between each manager's operating departments and exchange points where cross-functional communication was required. Cross-functional communication is two-way communication where the impact of activities between two functions occurs. It is a specific form of interpersonal communication. Interpersonal communication can occur between two people where each reports what is going on in their own function but the dialogue that links the two reports does not occur.

A process map was created after two rounds of revisions based on feedback during project team meetings (Figure 2). Interviews with the manage-

ment team were transcribed and examined by the authors. A multi-view perspective of the management challenges and pressures facing the company was created. The authors' interpretation of the data was presented to the full research team at the end of November 2001. The revised presentation, taking into account the debate and clarifications given during the meeting, is illustrated in Figure 3 and details the individual perspectives.

Evaluating

At this stage, the management team really appreciated the organizational snapshot. The management team was pleased to have the opportunity for open group discussion about ELCO's operations and agreed with the results of the analysis. In fact, it seemed to them that it should have been obvious.

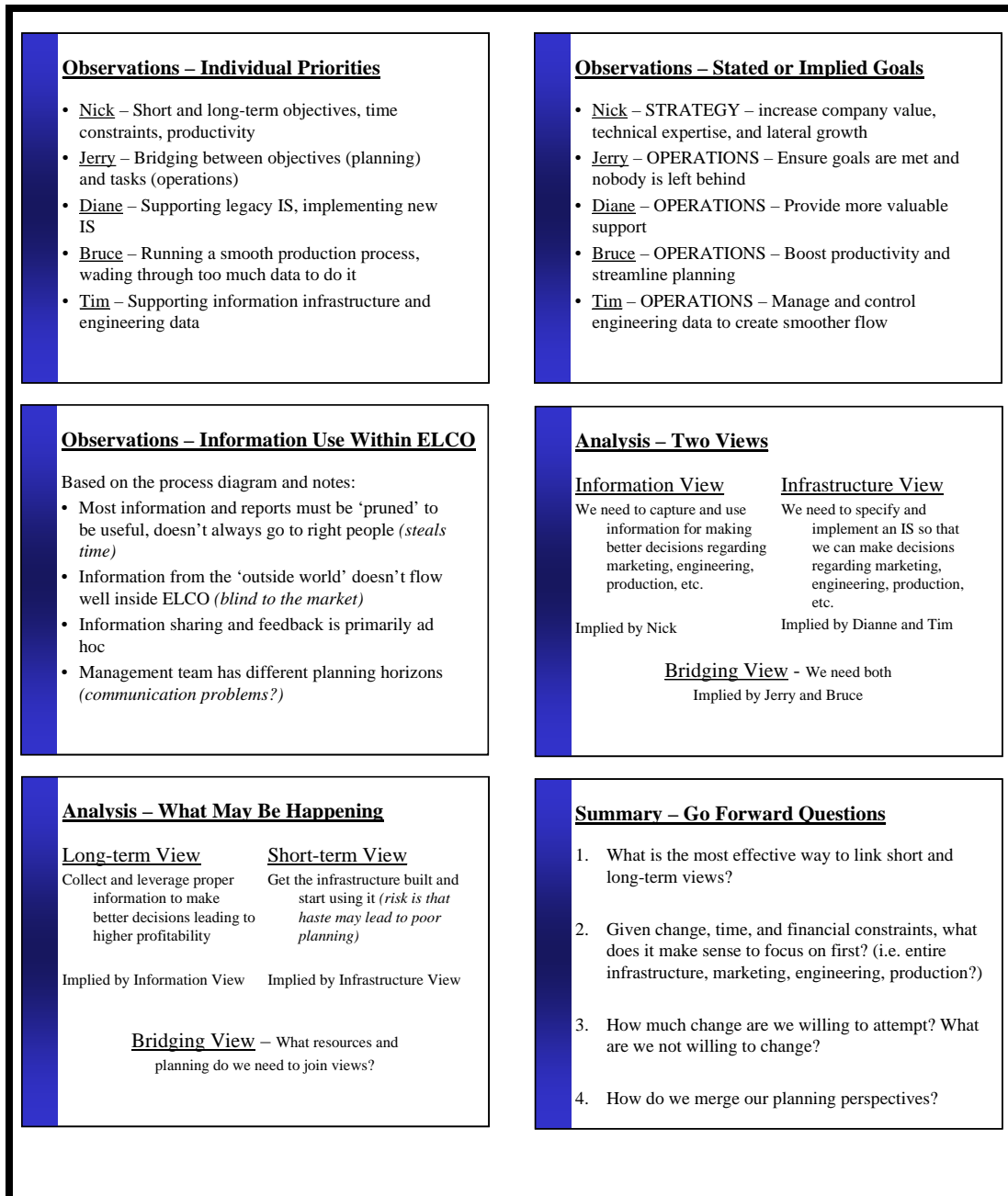


Figure 3. Baseline Analysis Presentation, November 21, 2001

Well, I'll tell you, it really hits home at what I think has been a difficult point for us. We need to find some way to communicate more if we are going to get anywhere. When the different perspectives are laid out like that, yeah, I can see why problems can happen. (Nick, during the analysis presentation)

From the interviews, it was clear that the management team felt burdened by the need to balance day-to-day operations and planning activities.

Well, I guess you prioritize [your plans for the future], and it's unfortunate because so many times the urgent takes over and the best gets left behind. It's the "tyranny of the urgent." It's like that. We fight that all the time. What is the best [action to take first]? Sometimes you just don't have the time [to plan ahead] because you feel this urgent need to get everything done at the end, the day-to-day stuff, too. (Diane, remarking on the difficult reality of medium to long-term planning at ELCO)

Relevant issues became apparent while the process diagram was being revised. The most notable was a difference in each manager's planning horizon. A second issue was the apparent lack of effective communication between managers.

[As far as what is happening outside of engineering] I would be interested in... production scheduling [information], as an example. If we've got a component problem, which is affecting the continuation of production...how soon do they need a technical problem resolved before it impacts production? I don't need to know how well production is doing in terms of getting product out the door. Where it would impact me is if they have a problem which I have got to solve, and knowing what their schedule is [before-

hand], so I know how much time I have to resolve a problem before it impacts production [is vital for planning in the Engineering department]. (Tim, explaining why cross-functional information is crucial in medium- to long-term planning)

Not surprisingly, differences between individual management perspectives corresponded with trouble areas identified in the process map, such as the barrier between the engineering and manufacturing planning functions.

It appeared everyone was in agreement on the observations, although some team members questioned a few of the conclusions.

I...was a little surprised about the communication problem to a certain extent. When [it was suggested] the management team had different priorities... with our different personality types and jobs we do, that is to be expected....I guess I was a bit surprised when I saw...different people were looking at long-term rather than short-term or short-term rather than long-term....I never really felt there was a big communication problem in the management team. Maybe we don't always listen really well and hear what the other one is saying, but most things are discussed. (Diane, commenting after the baseline analysis was presented)

Specifying Learning

One thing was clear. Each manager was spending too much time on collecting and working with reports and figures from multiple sources. This was getting in the way of their operating duties, something with which their colleagues used to help. The managers concurred that decreased communication caused this problem, which in turn was caused by increased time and planning pressures. This was the first direct indication that

a significant source of difficulties might be due to a loss of internal transparency; the idea that the managers were losing an awareness of what was happening in the functional departments around them. It was at this time that the authors began to develop and apply the concept of internal transparency.

Diagnosing

At the end of the first stage, the authors believed that the decision to grow resulted in an initial increase in the amount of planning activities. In turn, this reduced the amount of time spent in communication, which reduced the organization's internal transparency. It seemed that the loss of communication represented a problem for planning activities, and placed an additional burden on the company's ability to move beyond day-to-day *reactive management*. We suspected that there was a relationship between the different planning horizons and the reduction in internal transparency but were uncertain what that was.

Stage 2: Strategy Planning

When the research project was initially planned, it was expected that this stage would focus exclusively on IS planning to support growth. However, it was clear that ELCO's managers were struggling to maintain their own functions, much less grow the organization. Based on the observed planning horizon differences, the authors suggested, and the team adopted, a plan to articulate a common business strategy that, in turn, might be used to identify relevant IS needs.

For ELCO's managers, the implementation of an IS was viewed as much less important. They had come to see that defining their business priorities would need to be done before defining a new IS. Stage 1 had suggested that their problems were not related directly to the current IS but rather changing managerial pressures. During Stage 2, the team focused on building a coherent strategy for implementing a new IS that took into account

what was learned in the baseline analysis. With respect to the research question, we focused on identifying potential causes for the reduction in internal transparency and its relationship to business planning capability.

Action Planning

To ensure that the business strategy session would be completed and not fall victim to interruptions, the authors suggested an off-site planning session to minimize interruptions. The team agreed to a one-day planning session at the Queen's Executive Decision Centre (in Kingston, Canada, approximately a one hour drive from ELCO's plant), using facilities specifically designed for group decision-making and planning practices under the guidance of an experienced facilitator. A date in early December was chosen, and each person was provided with material that outlined a simple planning process.

Action Taking

The day-long session was split into two parts. The morning section covered a SWOT (strengths, weaknesses, opportunities, threats) analysis. The afternoon session built on the morning's results and consisted of the team members (including the authors) working alternately in pairs and as a group to decide on the three top strategic initiatives to be addressed in the next 18 months. By the end of the day, the team had reached consensus that the three top issues were market development (developing new products and stronger market presence), operational management (filling in the middle ground by joining the short-term and long-term views), and technology infrastructure (using IS to assist in regaining internal transparency). Results from the session were organized and distributed to the project team in the month following the strategy session. Interviews were conducted at the end of December to examine how well the management team felt the process went, and whether they thought they had created realistic plans to address their concerns.

Evaluating

The research team members embraced the results of the planning session. Some had been previously involved with strategy-planning exercises that had mixed results. In this case, however, all felt a strong sense of accomplishment.

I was pleasantly surprised, because I have been to a lot of [planning and strategy meetings] over the years, and I found in quite a number of them, unfortunately, you walk out with a lot of good ideas but not any plan on how you are going to do what the suggestions were. (Jerry, shortly after the planning session)

Even with the positive outlook, there was still caution about whether ELCO would be able to carry through with the planned strategy.

This was a good start at strategic planning for the purpose of setting the ground floor requirements for a forward move. But, ELCO's internal support systems are not ready for...growth, meaning the MIS system and even personnel. A lot of planning still [has] to be done. (Bruce, after the planning session)

There was relief that attention was being directed toward problem areas, but it was tempered by concern about whether ELCO could effectively deal with the problems.

There is a lot of work to move forward with a plan. If we don't have the people or the support of an MIS system this is going to be a problem, just getting the work done. [If we develop our market] we will get more calls from [sales representatives] and customers concerning product performance issues, you know, they want to know more, so you need to support the customer more...the list goes on and on. (Bruce, commenting on the challenges of implementing the strategy planning results)

The forces creating a "tyranny of the urgent" were evident in the management team's skepticism that change was possible. However, no one questioned that the correct problems had been targeted for resolution.

Specifying Learning

This stage demonstrated a significant shift in the organization. Previously, ELCO had not planned its IS activities or attempted any form of alignment to its business strategy. Here, the management team had articulated a business strategy (Priority #1) and then worked out the implications for IS planning of those decisions. This clearly demonstrated an evolution in IS-business alignment practice from administrative integration to sequential integration (Teo and King 1997). This was important because it led to several insights about the process by which the existing IS had become unacceptable. The existing IS did not support the type of information required to support either market development (Priority #1) or operational management (Priority #2). This marked a significant change in IS planning. Until this time the reason for a new system was not identifiable, but now it was apparent that it related to both long-term and medium-term needs.

Diagnosing

We became convinced that the different planning horizons were not a cause of the reduction in internal transparency but rather the opposite. The reduction in internal transparency had led to operational difficulties. Lower internal transparency made the managers' operational tasks harder to do, which meant that they had less time for planning. When they had time, they did not have the right information. Hence, two behavior changes were identified that weakened the existing IS structure. First, the introduction of new planning behaviors necessitated new information requirements (e.g., easier access to customer and market information). Second, the reduction in time for cross-functional communication caused, through a reduction of internal transparency, a

greater need for accessible and structured information than had previously been communicated and contextualized by other managers.

Stage 3: Requirements Specification

The final stage of the project translated the strategic plan into a request for quotation document. In this stage, the work distribution of the team became very different. Two people (one author and one manager) focused on developing the RFQ while the remaining team members reacted to document drafts with comments and suggestions. We believed that the research question would be addressed through identification and validation of the types of issues that would assist in defining the new IS.

Action Planning

At this stage, the project transitioned from identifying a course of action during the strategic planning stage to acting on a particular initiative, in this case preparing the RFQ. From the authors' experience, two months seemed to be a reasonable time frame for this activity and coincided with the formal end of the six-month project. However, the six-month time period could have been extended with the agreement of the funding agency (the agency would have readily agreed to a one or two month extension) and as such the deadline was not the motivation behind the two-month time frame.

Action Taking

Diane and one of the authors developed the RFQ itself and worked together to define the IS specifications required for the RFQ document. Requirements analysis consisted of a variety of data-gathering activities such as cataloguing and augmenting the IS specifications from existing systems in use, requirements-oriented analysis of the strategy-planning exercise, and personal interviews with key IS users. Of particular interest

to the RFQ authors was the communication between functional departments in the company, referred to as the *information exchanges* between functions. The requirements-gathering activities were conducted at the ELCO site and lasted two days. All project team members contributed their suggestions and changes during three revision cycles over the following four weeks. By the end of this process a final version of the RFQ document was agreed upon and completed. ELCO received the RFQ and a copy was provided for the government support agency, formally ending the practice element of the project.

Evaluating

This stage resulted in an RFQ calling for three distinct systems (materials requirements planning or MRP, marketing management, and project management) with the capability to communicate and share information between them. The new MRP system would replace the outdated mini-computer while the marketing management and project management systems represented entirely new IS for ELCO. While the decision to follow through with three separate systems rather than one single system had been the topic of considerable debate, the final decision rested on the realities of operating a small business. The purchase cost of an integrated, multifunctional system would be quite high, and the project analysis to this point indicated there was not as great a need to integrate data between systems as there was to have efficient, open but controlled, access to company data. In the end, a decision to invest in three subsystems was seen as an effective compromise between functionality and cost, especially given the uncertainty about ELCO's future state. In Jerry's words,

Well, we have to be practical, right? We have to ask ourselves, what is our biggest need? But at the same time I have to keep an eye on cash flow. Now sure, there are times when Bruce could really [benefit from] having his [manufacturing system] automatically know what is happening in Sales, or Engineering, or

whatever, but right now my biggest worry is the time it takes to do scheduling, and right now our [computer] system just isn't up to the task....Now, we've been talking about sharing our departmental information more, and I am all for that so long as we need it and act on it...[but] in the end we have to look at what we can afford. (Jerry, during requirements analysis)

Specifying Learning

Initially, the results of this final stage of the research project did not appear to have much effect on the research team members' view of how technology could assist in ELCO's operations. The management team maintained an understanding following the baseline analysis that technology was not going to make their challenges disappear automatically. Success would hinge on how individuals integrated IS into their operating activities.

If we don't understand what it is we are trying to do, putting a system in place isn't going to fix it. I think putting a system in could help a lot, but only if you do excellent training. Otherwise, you are going to get garbage-in, garbage-out. You have to understand what it is you are trying to do in terms of moving work through a process. (Nick, during the last round of RFQ revision)

However, one subtle change was apparent in the way the management team discussed the use of IS. Formalizing the project's results into a specification document for new technology systems required everyone to be very explicit in what they expected IS to accomplish for ELCO, and the degree to which they had confidence in specifying ELCO's future needs. The RFQ revision process required them to share and discuss their cross-functional plans much more than had been done in the past year. The managers rarely made distinctions at the beginning of the project between their interpersonal and cross-functional communication habits or patterns. For example,

when asked about how well and how often the management team discussed plans and issues, the typical response was

Well, we have a management meeting usually once a week. These meetings are really just the formal who's doing what, what's coming up discussions, but we also see each other in the building all the time....I mean, there are only 32 people here; you can't help but talk to each other. I would say we communicate quite well. (Diane, during the baseline analysis stage)

However, at the same time, it was also clear there were particular times when effective communication was not occurring:

I know there have been times when things have been missed, deadlines extended, and sometimes it turns out that there was an [engineering report] or sales order misplaced that really affects [operations for] Bruce or Tim....we certainly talk to each other on a daily basis, but when it comes to knowing what each person's department is doing, we don't always have time to talk about the details like that. (Diane, during the baseline analysis stage)

It seemed that the strains of reacting to Nick's original decision to jump-start ELCO's growth—the punctuation—caused significant behavior changes that lead to weakening of the existing IS.

Diagnosing

As the RFQ developed it became clear to the core research team that there were two types of important communication patterns going on inside ELCO. There was both an interpersonal as well as a cross-functional communication process, and while the interpersonal communication was still effective, the cross-functional communication was not. Through deliberations, the new systems were not only seen as being able to provide the

operational capabilities required to organize and plan the company's operations, they were also seen as a way in which to regain the level of internal transparency that was lacking.

Nick: "When we talk about the project management system [for example]...I think we agree that [expecting the system to give us successful projects] is not valid. I guess what we need to do is validate the need for the project management system..."

Author: "I'll tell you what I think the project management system...has to offer [ELCO]. The best capability it will offer is [when the other managers use it] to see how the product development process is progressing, increasing the transparency of the engineering department to everybody else."

Nick: "Totally agree. Particularly [for me]." (Nick and an author, during the RFQ revision process)

They also realized that an ERP was not a feasible solution, as it was not possible to develop a vision of an integrated system when there were many alternative views of ELCO's future—it could contract, grow a little, grow significantly, or stay the same. In the end, the RFQ specified a solution that no one believed would be the perfect long-term solution for ELCO but rather defined an IS that would allow ELCO to regain its internal transparency and provide some basic planning information while respecting cash flow and other resource requirements.

Going through the RFQ generation process forced ELCO's management team to apply this new understanding in a way that introduced them to a new way of thinking about how they shared information. They believed that IS should be capable of assisting their operation by enabling a higher degree of cross-functional communication but still in the informal manner in which they were comfortable and successful.

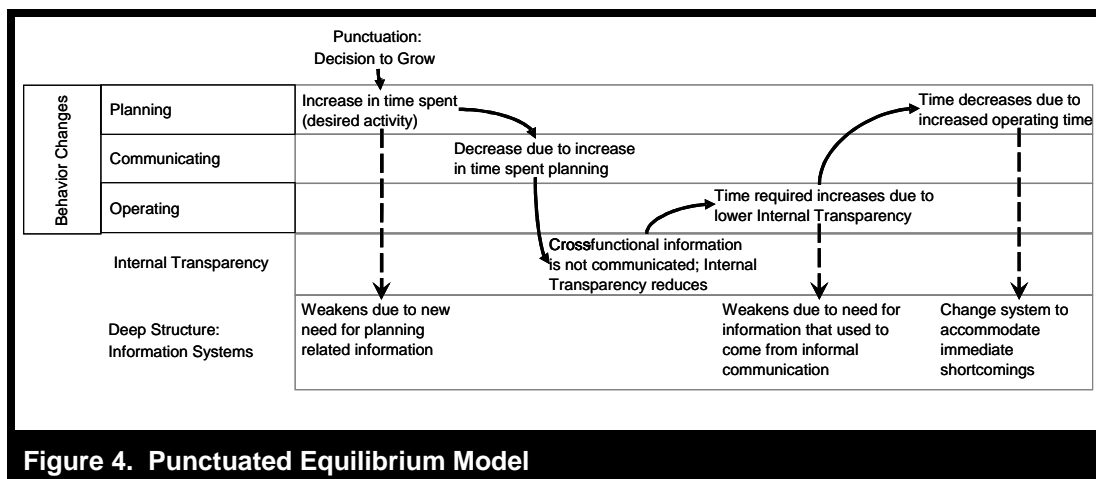
Summary

This project delivered its goals on two dimensions. First, the project team was able to develop an RFQ that satisfied ELCO's requirements. Second, the authors found results that highlighted how planning, communication, operating behaviors, and an IS in a small business are interdependent and vulnerable to exogenous punctuations to the organization. We also found it interesting how our nascent theoretical perspectives influenced the next action research stage and how each stage refined our developing perspectives. Indeed, we were surprised in the last stage (we thought most discovery would occur in the earlier PAR cycles), when the importance of the distinction between cross-functional and interpersonal communication emerged.

A Punctuated Equilibrium Model

The decision to grow can be seen as a punctuation to the small business. In the following sections, the sequence of behavioral changes that results in a weakening of the deep structure of the existing IS and causes poor operating and planning outcomes is demonstrated. This model is developed from the diagnosing sections of the action research cycles. We want to be cautious in proclaiming this as a general model but believe proposing it serves two purposes. First, other researchers can look for concurrence between their findings and ours. Second, there are many small businesses that could be seen to be similar to ELCO. Not every small business would experience this dynamic process the same way, but it would seem reasonable that there would be others that would.

An interesting result of this research project was that the IS became viewed as obsolete almost immediately upon the launch of the growth strategy before any organizational or structural characteristic usually associated with growth changed. The model in Figure 4 describes our=



interpretation of why this happened. Four managerial responses occur sequentially to the punctuation: an increase in time planning (as desired), leading to a decrease in time communicating cross-functional information, followed by an increase in time spent managing operations and finally, and contrary to the initial response, a decrease in the amount of time spent planning.

Response #1: Increased Time Spent Planning

Planning behavior increases in direct response to the punctuation, the stated goal of growing. In order to prepare ELCO for growth, the managers needed to increase the amount of time spent planning. As part of these new tasks, the existing IS structure weakens as different information than normally provided through the IS is required by the managers. Another implication of the increased time spent in planning (and in some cases traveling to see potential clients) is that the senior management team had less time to communicate cross-functional information.

Response #2: Decreased Time Spent Communicating Cross-Functional Information

As more time was spent planning, ELCO's management decreased the amount of time that they spent communicating cross-functional information. This was seen as a subtle change but it turned out to be one with significant effects. It occurred as an instance of the managerial capacity problem (Jensen and Meckling 1976; Oi 1983) wherein the addition of new planning tasks requires other tasks to be removed from activities—in this case, cross-functional communication. The informal networks that communicated cross-functional information and maintained internal transparency disappeared. This spoke clearly to the fragility and necessity of the social context of an information system in a small business, much in line with the work of Brown and Duguid (2000) amongst others. ELCO's management team was highly interdependent; each individual's actions influenced the planning actions of the others. The social context had provided the necessary information in the past, but changes to that context

had corresponding negative effects on communication practices. This is in concordance with the sociotechnical nature of IS development and implementation as supported by Mumford and her colleagues (reported in Mumford 2001). Not only is development a sociotechnical phenomenon, maintenance of existing systems would appear to be so too. Extending on the existing literature, we also found that the effects are asymmetric in that changes in the social context affected cross-functional information before interpersonal—managers continued to talk but not about what they were doing that affected other managers. This might be partly explained if cross-functional communication (how my activities affect yours) were reported through informal channels and other information (reporting on my activities) were reported at meetings that were maintained.

In retrospect, the symptoms of internal transparency loss during the transition period were quite evident. What is interesting is why no one saw it at the time or at least realized it was a problem. Even after the potential problem area was identified, however (Nick, for example, did think that an improved information system might help), doubts still existed whether the root cause really did relate to management communication practices, as evidenced by Diane's early doubts about whether communication problems actually existed. While the baseline analysis suggested communication problems, the communication habits within the management team were little different than in the past. The difference was that the informal practices changed whereas the formal structures did not change. Eventually, the social system in which the IS worked changed to such a degree that the legacy system became inadequate.

Response #3: Increased Time Spent Managing Operations

The legacy system became inadequate as the results of reduced internal transparency became apparent. It meant that managers had to spend time gathering and analyzing information that previously was provided by their colleagues. This

further weakened the existing IS by demanding new ways of accessing existing information. Hansen (1995) foresaw this effect when he stated that "any constraint on a small group's internal communication structure seriously (interferes) with the group's ability to perform complex tasks." Communication constraints were also considered a cause of lower levels of task accomplishment, an effect later confirmed by others (e.g., Snyder and Morris 1984). Diane had perceptively picked up on the very dynamic that was at the root of the problem: while the interpersonal communication, which provided information about what each person was doing, was essentially unchanged, the cross-functional communication, the provision of information regarding the actions and results that were being delegated, was sharply decreased.

I mean, there are only 32 people here; you can't help but talk to each other. I would say we communicate quite well...

we certainly talk to each other on a daily basis, but when it comes to knowing what each person's department is doing, we don't always have time to talk about the details like that. (Diane, during the baseline analysis stage)

Most published accounts of the operating characteristics of a small business depict an environment where individuals are naturally aware of what is going on around them, what we called internal transparency. We found that cross-functional communication breakdowns resulted in the loss of internal transparency, which created operating difficulties. The managers were still communicating personal plans and developments but not what was going on around them. The existing IS could not make up the gap. The result was that the managers reduced the time dedicated to planning.

Response #4: Decrease in Time for Planning for Growth

As the managers reduced the time dedicated to planning, the necessity to replace or enhance

ELCO's IS became obvious. The link between decreased communication and planning difficulties has been established by authors such as Bavelas (1951) and Leavitt (1962) but a mechanism explaining the relationship to IS has not. Using this model, we suggest that planning difficulties are, at least partially, directly attributable to reduced internal transparency. These effects were manifested within ELCO as difficulty in planning for growth.

This behavior response was in direct opposition to Nick's stated goals, and contrary to Response #1, the original reaction to the punctuation. In spite of the short term increase in planning time, ELCO's IS could not support the organization's information needs and the time planning was returned to operational management. Change of some sort had become essential. ELCO's IS changed in response to the punctuation. Before Nick purchased ELCO, its information needs were serviced by an IS that was neither modern nor up-to-date. It held together and was made functional through the communicative efforts of the managers. All technology-based IS are a mix of social and technical components and this system was no exception. As Nick moved the company into growth mode, the social system changed; communication practices altered and the technical flaws of the system became apparent. Formal meetings continued to convey information but not the cross-functional information requisite to maintain internal transparency. At the start of this project, the system was viewed as inadequate and in need of replacement, even though ELCO's operations had not changed in any obvious manner. The managers blamed the IS for its failings when in reality it was they who had changed.

Deep Structures: Impact on Existing IS

In response, ELCO has defined a satisficing solution. We call this a satisficing solution as it meets ELCO's current direct needs within budget constraints, but it is not necessarily the ideal long-

term solution. It was difficult to design the perfect system for the future due to uncertainties about the future state of ELCO's business. Many firms would be unable to define the ideal system at this stage. Rather, they may need to be content to make changes that compensate for the decrease in cross-functional communication and internal transparency while minimizing expense and change. Given that successful growth firms seem to put into place the foundations for the larger enterprise before they are absolutely essential but do not overly formalize the organization too quickly (Hambrick and Crozier 1985), a satisficing solution may help navigate this delicate balance.

From this model, it is clear that the existing IS—a deep structure—is weakened very quickly by behavioral changes in response to the punctuation. First, newly initiated planning activities may require additional functionality. In turn, cross-functional communication likely needs to be supported using more formal methods. Not compensating for these weaknesses may result in negative outcomes for operational and planning tasks. Therefore, our findings would suggest that firms embarking on growth need to consider limited adaptation of their IS before starting to plan for future growth.

Discussion

IS processes that had adequately supported ELCO in the past silently failed when they began planning for growth. This finding suggests that the transition effects on IS may occur very early. This is, of course, troublesome because the organization might need to consider IS investments that it can neither afford nor clearly specify. ELCO dealt with these problems by adopting an approach that adapted their infrastructure at the lowest cost and minimal degree of change.

The ELCO project illustrates three lessons regarding transition pressures during small business growth, informal communication practices, and the internal transparency of an organization. First, increasing operational business pressures

such as managerial time constraints provoke changes in informal communication practices (Vinten 1999). Second, cross-functional communication practices may be prone to difficulty during transitions. Third, these breakdowns lead to decreased internal transparency, and the accompanying difficulties. Understanding and avoiding the negative effects that business growth can create for informal communication practices in small business is a necessary step to successful small business development.

Research Implications

Internal transparency and its central role in small business growth and IS management is potentially an important concept that should be introduced into new studies. While many authors moved around similar ideas, this paper names and situates it for the first time within the IS literature. It will be very interesting to see if, as we propose, decreasing internal transparency generally results in decreased operational and planning performances. Internal transparency is particularly salient for small business and IS studies, as the social structures upon which many small businesses rely to maintain their internal transparency come under pressure through growth due to managerial capacity constraints (Barringer et al. 1998). It should also be noted that internal transparency is something that it is hard to realize is missing (if you knew it was missing, you would probably try to take action to restore it, as ELCO did). In this situation, the introduction of the authors as action researchers allowed the injection of a perspective that demonstrated the loss of internal transparency.

As small business growth tests the capabilities of informal communication channels, formal systems become more essential to fulfill the information needs of an increasingly complex organization. The expected role of IS in improving communication within a small business is similar to the results seen from other authors (Levy and Powell 1998; Shin 1999). This paper makes a distinguishing contribution in identifying that the poten-

tial need for IS change occurs very early, before many other structural or organizational changes are required. Intention to grow seems to be the first critical point, not actual growth. This is in line with general findings that small business managers should prepare organizational structures for the larger organization before they are absolutely necessary (Barringer et al. 1998; Churchill and Lewis 1983). Our findings show that this is also true for the IS and true at a very early stage. This suggests a process by which IS and business strategy alignment (e.g., Sabherwal et al. 2001) is undermined very early on through the changes in managerial behavior. The point in time at which this change occurs indicates when the need for realignment planning occurs. Echoing the results of Sabherwal et al., who described recurring patterns of strategic realignment that took place over a long period of time, we also came to understand that ELCO's challenges actually began to take root at a point when the company still appeared relatively stable.

As shown in the literature review, small business technology adoption research often theorizes the owner/president as an individual decision maker. However, in our case, while Nick played an important role, the management team as a whole made decisions regarding technology and what technologies specifically to adopt. Whether this is a change from previous findings that emphasize the role of the CEO (DeLone 1988) or another example of a diminishing influence (Harrison et al. 1997), it raises an interesting question about the appropriate unit of analysis for these types of decisions. Group decision making frameworks may be more appropriate as presidents/owners realize that buy-in is important for technology-based change projects (Kotter 1996).

Deciding on the types of information best suited to be shared through IS depends on an examination of the networks within the small business. The informal communication practices within a small business can be broken into two constituent parts: the interpersonal and the cross-functional. These two base types are affected differently during the transition process. We found interpersonal com-

munication at the top management level, the sharing of information regarding each manager's personal responsibilities and immediate actions, to be robust in the transition periods. Small business managers can be expected to discuss their activities, given that they work closely and frequently together. On the other hand, cross-functional communication at the top-management level, the sharing of information regarding the status and future plans of each manager's functional responsibilities or departments, was not as robust. In transition phases, sharing of information that is not immediately at issue often does not occur. It is this cross-functional information, the information contained in manufacturing and engineering schedules, sales forecasts, or accounting reports, that may fail to be shared during transitions. This cross-functional information is well suited to being maintained using IS. Further, interpersonal communication technologies such as instant messaging, e-mail, or bulletin-board style systems are probably not as helpful to the small business during growth stage transitions relative to the cross-functional systems. Within our study, the managers did not bemoan the fact that it was difficult to send e-mail to each other (they all had to use the same terminal to send e-mail) but did worry about cross-functional information. As seen in Stage 3, it may be that the most desired aspect of IS functionality includes the aggregation and dissemination of information between areas of responsibility.

Managerial Implications

A small business contemplating growth must be aware of the effects of transition phases on informal communication and internal transparency within the company. This research speaks clearly to the need to develop procedures to ensure that Internal Transparency does not unduly suffer and become a significant problem. One approach is to plan a transition to include more formal practices, which might include increased IS usage, to exchange cross-functional information.

Evaluation of the capabilities of the organization's IS is required. In addition to basic communication

support, critical evaluations of proper managerial access and system security are important. Two overriding questions at this stage should be whether the IS is capable of capturing and providing the correct management information needed to provide internal transparency to top management in a timely manner, and are people using it?

Finally, there is another awareness issue; an understanding that the communication practices of the post-transition small company will frequently change again during the next transition period. Using internal transparency as a guide, modifications to a business's structural and organizational characteristics should require corresponding modifications to communication practices. Just as the structural and organizational characteristics that create success in one stage must change for the next, fundamental changes in communication practices must occur as well.

Action Research

Action research can be an exhilarating experience for the researchers and useful for the practitioners. However, the research outputs must have a broader interest and theoretical significance if the work is to be truly differentiated from, as many critics characterize it, consulting. While reflecting on why a reader should believe that our work truly embodies the principles of action research, we recalled Mumford's (2001) succinctly stated three problems: getting in, staying in, getting out.

Getting In: Our introduction to ELCO was facilitated by the funding officer. She was able to ensure that researcher and practitioner came to the project with an appreciation of each other's needs. Rapoport's (1970) initiative dilemma never became a substantial concern. We also developed a document that defined expectations surrounding the project. Given that many academics criticize practically focused funding agencies, our experiences may show that an effective funding officer, with a true appreciation for the way in which research and practice can inform each other, can be a great aid in the action research

process. While Nick invited us in, we had to build relationships with ELCO's managers, which we did through individual meetings and a gradual approach to getting to know them. In some other forms of research, researchers come in for one day, try and capture everything and never have the opportunity to develop an empathetic and understanding relationship. Action research allowed, and demanded, that we take the time to develop an effective working relationship.

Staying In: ELCO's management team was mutually supportive and had a good working relationship. While the organization's IS was being criticized, the criticism was not directed at the controller, Diane. Indeed, Diane was viewed as highly competent for being able to keep the system running. Therefore, there really was no bad guy. We were fortunate in that we did not have to encounter a situation where we were in the middle between competing factions. The researchers were never seen as problems, most likely because the project was moving forward and achieving mutually agreed goals on time. The managers were comfortable with why activities were taking place, a benefit of using PAR.

Getting Out: Our formal involvement with ELCO ended when the RFQ was completed. One might argue that we left too early to adequately judge the efficacy of the action research process, but Nick felt that he was able to manage the acquisition process from that point onward. As a postscript to this project, the first author was invited back to ELCO in February 2003, to take part in an IS selection meeting (the second author had moved a significant distance away). In the intervening year between the end of this project and the final selection meeting, Dianne and Bruce released the RFQ for vendor responses, accepted proposals, evaluated eight of them, and short-listed three for further consideration. By this time, the decision was down to two competing products. Both packages incorporated an integrated manufacturing planning system with a marketing management system. A decision to not include a project management system was made with the intention of revisiting it in the future. At the end of this meeting, Dianne and Bruce were directed to

perform a final check on the references of previous companies who had purchased one particular system, and, if satisfactory, to engage the vendor and pursue purchase.

While the final recommendation, three separate systems, was not followed exactly, it was ELCO's responsibility to make the final decision. During the final selection meeting in February 2003, the project team discussed once more how important it was to recognize they were an interdependent functional team, how one person's actions significantly affected everyone else, and why transparency in their actions was crucial as they grew. This discussion came much more easily to the group than it had a year and a half previously. Considering the progress they made on their own in the year between the end of the project and the final selection meeting, understanding and internalizing internal transparency made a significant difference in their company. In retrospect, the greatest achievement of the project may have been the understanding they gained of internal transparency, and how their IS could enable it, but not create it.

In addition to Mumford's comments, we reviewed the action research literature in general and the PAR literature in particular and established several common themes of desirable PAR characteristics. A well-known framework by Lincoln and Guba (1985) introduces four criteria for qualitative research: credibility, fittingness, auditability, and confirmability. In Table 1, we have situated common action research criteria within this framework to provide a broader perspective. Further, we have elaborated on criteria commonly referred to in the IS action research literature in the following paragraphs.

Genuine Problem: Many authors have stated the importance of solving a genuine problem through action research (e.g., Baskerville and Wood-Harper 1996; Kock 1997; Lau 1999). Eden and Huxham (1996) identified a common theme of action research that the "research output results from an involvement with members of an organization over a matter which is of genuine concern." Nick defined our practice problem before he met us. Indeed, the funding officer knew to bring the

Table 1. Evaluating the Participatory Action Research Process		
Criteria for Qualitative Research (Lincoln and Guba 1985)	Desirable AR Characteristics	Examples From This Study
Credibility: faithful descriptions or interpretations of a human experience that the people having that experience would immediately recognize it	<p>The observations are recorded and analyzed in an interpretive frame</p> <p>Critical reflection on how data were socially constructed through research team interaction (Klein and Myers 1999)</p> <p>Stakeholder viewpoints are compared and contrasted (Stringer 1999)</p>	<p>Researchers continually developed and presented individual views and prompted discussions to resolve views and create understanding</p> <p>Diane's apparently conflicting remarks regarding communication behaviors was highlighted through interpretive frame</p>
	<p>The research should be set in a multivariate social situation</p> <p>Credibility is established through triangulation of information from multiple data sources (Stringer 1999)</p> <p>Sufficient data must be collected to provide rich, deep insight (Myers 1999)</p>	<p>Research was conducted entirely on-site, involving the complete management team and two researchers</p> <p>Data collection included transcribed interviews, official and unofficial company documents, e-mails, observation notes, planning session results, over 500 pages of data</p>
	<p>Changes in the social setting are analyzed</p> <p>Participants' roles are expected to change over time (Lau 1999)</p>	<p>Research participant roles noticeably changed during project</p>
Fittingness: findings fit into contexts outside the study situation	<p>The research should illuminate a theoretical framework that explains how the actions led to the favorable outcome</p> <p>Details regarding the changes that occurred should be related to general concepts to explain the nature of the changes and why they might have occurred (Klein and Myers 1999)</p> <p>Purpose of research is to extend understanding of an issue²</p>	<p>Planning actions became easier as communication practices improved, which led to the insights about internal transparency</p> <p>A general PE model was proposed</p>

Table 1. Evaluating the Participatory Action Research Process (Continued)		
Criteria for Qualitative Research (Lincoln and Guba 1985)	Desirable AR Characteristics	Examples From This Study
Auditability: when another researcher can clearly follow the “decision trail” used by the investigator	Future researchers can clearly follow the “decision trail” used by the investigator (Lau 1999)	The methodology and results sections provide a reliable audit trail regarding: how the site was selected; how the project parameters were decided upon; what data was collected, when, and by whom; project duration; and the interpretive data analysis method followed
Confirmability: Engagement with the things to be known is sought in the interests of truth	Direct research participant actions intervene in the research setting (Baskerville and Wood-Harper 1998)	Changes were introduced throughout the project to test their effect and usefulness (e.g., staff members defined their own information requirement needs, research team used results from each stage in later phases)
	Principle of interaction between researchers and subjects (Klein and Myers 1999)	
	Researchers seek to engage principal stakeholders actively (Stringer 1999)	
	Data collection includes participatory observation	Researchers kept personal project logs and discussed group interactions
	Researchers develop research context by observing the actual environment and the actors within it as they live and work (Stringer 1999)	Researchers verified comments and remarks, checking that what was said was what was actually occurring

practitioners and academics together because both had articulated similar interests. We believe that this project satisfies the criterion of solving a genuine problem.

Rich Data Collection: In order to understand deeply the process under study, researchers need to take care when recording data and observations (Baskerville and Wood-Harper 1996; Singer 1999). To this end, research was conducted entirely on-

site, involving the complete management team and two researchers. Data collection included transcribed interviews, official and unofficial company documents, e-mails, observation notes, and planning session results—over 500 pages of data. We also discussed the data collection and summary methods with the practitioners. For example, the presentation provided in Figure 3 is the product of collaborative data aggregation, based on records kept by the researchers.

Genuine Collaboration: The importance of true interaction and dialogue between researcher and practitioner is essential to most forms of qualitative research (Klein and Myers 1999) and action research is not an exception (Singer 1999). We were struck by the amount of time spent discussing what was going on in the project as we attempted to understand ELCO and its managers. Recognizing our ethical research responsibilities while using an action research approach left us careful not to ascribe motivations and beliefs too quickly. Our role as committed and active participants—we wanted to see ELCO succeed, not for financial reasons but because we felt an affinity with their goals—contributed to our focus on understanding and the collaborative experience.

This research project would not have been possible to do using any other methodology. The funding agency insisted that the company and researchers work together in order to maximize the opportunities for knowledge transfer between the two groups. Also, Nick would not have been willing to commit ELCO to this project without the active involvement of the authors in problem solving. The action research methodology provided us with guidelines and criteria that allowed us to participate in the project and address our research questions. Indeed, as Baskerville and Wood-Harper (1996) suggested, the ELCO management were pleased to be an interesting research site.

Research Versus Consulting: While a common criticism of action research is its potential to be “consulting masquerading as research” (as noted by Baskerville and Wood-Harper [1996] among others), in this situation action research was viewed by Nick as different than consulting. Recall that Nick specifically wanted to avoid consultants. When action research was explained to him, he felt comfortable that this method allowed him to do so. He never seemed to see us as consultants, a feeling perhaps helped by the fact that we were not submitting invoices and he was not writing checks.

More importantly, we hope that the concept of internal transparency and its relationship to small business growth, IS, and managerial behaviors will

be seen as research contributions. As discussed in the research implications, our findings should have implications well beyond ELCO. We believe that our findings would not have been possible without the interplay between theory and practice demonstrated in this project.

Time Pressures: As our project was structured within a specified time period, this might potentially harm the research integrity of the work (Baskerville and Wood-Harper 1996). To this we can only say that we did not find ourselves driven to meet the timeline or that we sacrificed addressing the research questions to expediency, but were able to stay true to our goals (Seashore 1976) with the support of our industry partners who were also interested in our success. Further, while the RFQ was delivered at the end of the six-month project, the research perspective has continued to be developed over the past year and through the process of developing this manuscript.

Practitioner Involvement in Research: Participatory action research differs from canonical action research or action learning in that there is “the notion that some members of the organization being studied should actively participate in the research process rather than just be the subjects of it” (Whyte 1991, quoted in Eden and Huxham 1996). From Eden and Huxham, “this suggests a two-way relationship; the research becomes involved in and contributes to the practitioner’s world, and the practitioner becomes involved in and contributes directly to the form of the research output.”

There were times when the authors were clearly identified as being in the practitioner’s world, such as when we discussed deliverables, business needs, and constraints with Nick, when we proposed and took part in the strategy planning session, and during the RFQ-creation process. At these times, it would have been difficult for an uninformed observer to tell that we were doing research.

There were also times when the entire ELCO management team was clearly in the research world, such as when we discussed the small

business experience, growth, and internal transparency during interview sessions. The ELCO managers were active in interpreting and making sense of what was going on at the conceptual level. They commented directly on our developing research perspectives. Indeed for the last two cycles, they had to ask questions in order to understand the reasoning behind our interventions. Again, at these times, an uninformed observer would have believed that the management team was participating as researchers only.

As researchers and practitioners were both involved in considering research and practice problems, the entire team was concerned with both sides. Further, the cyclical nature of action research meant that in order to take appropriate actions, the theory development was important to the entire team. The authors certainly spent more time on theory development, but ELCO's managers clearly contributed to the development process. Our perspectives and developing theory changed in response to the reactions of ELCO's management, a flexibility that we view as a strength of the method, as did Davison and Vogel (2000).

Limitations

While we believe the evidence for our claims is strong, it is difficult to prove the absence of bias. As action research is essentially a problem-discovery or problem-solving approach where the participants continually gather, analyze, and refine their understanding of an issue, there is the possibility that had the research environment been different, the results would have significantly changed as well. Nevertheless, as shown in the research site description, ELCO was a fairly typical small manufacturing firm. The authors were classically trained in systems analysis and design techniques and had worked in design projects previously and could be seen as representative.

The Hawthorne effect (Roethlisberger and Dickson 1939) is a well-known limitation in action research studies (Baskerville and Stage 1996). The

limitations imposed by the Hawthorne effect were that the problem itself, communication and internal transparency issues, and their effects on planning and growth fundamentally changed as the research group identified and focused their attention on it. It cannot be ruled out that the issues addressed in this research project were in part created or modified by the research participants themselves during the project. This validity threat is also fundamental to the action research methodology; however, the essential action is to introduce changes to the environment throughout the exercise. In any event, the results represent the resolution strategies, the key actions, and the outcomes of those actions as experienced by the actual people living and working in the research environment.

Finally, as much of our reported data and conclusions are based on our working relationship with ELCO's managers, there is the possibility that we simply did not get the true story from one or more participants. However, while there may have been some suspicion or concern about motives at the start of the project, we felt that the team became open and honest very quickly. For example, we were conscious of what Rapoport (1970) termed the *rejection phenomenon*, a negative practitioner reaction to our intervention, but did not see it and as such believe that we obtained the managers' real perspectives. Additionally, the data were interpreted and acted upon by the research team. The study is, therefore, limited by our biases and actions.

Conclusion

Communication practices within a successful small business normally provide the required levels of internal transparency during stable periods. However, from the earliest part of a transition period, communication methods change. Failure to properly adapt showed itself as a crisis of planning at ELCO. A decrease in internal transparency is often itself caused by decreases in the cross-functional communication that are caused by increased managerial pressures. Small

business management often finds itself in a circular holding pattern as day-to-day operations and transition planning consume more and more of their personal time and attention, leaving less and less time to inform their management colleagues of what is happening in their part of the company. This tyranny of the urgent can have drastically negative effects on the Internal Transparency of the organization, ultimately leading to more difficulty in planning for the future.

What surprised us in our research was how quickly internal transparency fell away and the need for an IS arose. This need translated into a requirement for the organizational IS to be used to maintain the informal cross-functional communication channels that used to be accomplished through face-to-face communication among top management. Using IS to provide a window where management can inquire on and observe the interdependent operations of their management colleagues on an as-needed, ad hoc basis offers at least two important benefits. First, proper access to cross-functional information offers the capability for time-constrained managers to gain access to required operational information according to their own needs and schedule. Second, the as-needed, ad hoc access also facilitates and maintains the informal communication processes that characterize successful small businesses.

We thought about what might have happened at ELCO without this project. They might have purchased more IS and internal transparency might have increased by luck in picking and implementing the right software. Poor IS would have continued to be seen as the cause of the problem and the next time a similar problem arose, the same solution may have been attempted. Technology would always have been seen as the solution. Alternatively, they might have realized that there was a problem with the social system, gone on a corporate retreat, and resolved to communicate cross-functional information better. This might have worked fine until time pressures built again and caused communication to decline. There was a genuine requirement to improve the IS in a focused way. Finally, through the action research process, we were able to shed light on

the root problem and to address ELCO's difficulties directly and facilitate the development of a better understanding of the underlying processes. This benefitted ELCO as well as similar firms and the research community, all in line with the basic goals of action research.

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